What is claimed is:

1. A gateway apparatus comprising:

a host computer having a host bus;

one or more local area network interfaces coupling said host computer to one or more local area networks than carry data between said gateway and one or more devices located within a customer premises;

one or more external network interface circuits coupled to said host bus for interfacing said host computer to one or more networks external to said customer premises which deliver analog and/or digital video and other digital data to said customer premises; and

wherein said host computer is programmed to implement an IP packetization process to receive data from said external network interface circuits and packetize it into IP packets, and programmed with a routing process to receive IP packets from said IP packetization process and encapsulate them into local area network packets and transmit them on the appropriate local area network via one or more of said local area network interfaces and for receiving local area network packets from devices coupled to said local area networks and stripping off the local area network packet headers and routing the encapsulated IP packets to the appropriate external network interface circuit for transmission over an external network, and a management and control process for receiving requests for data from said devices coupled to said local area networks and sending digital control data to said external network interface circuits to control them to obtain said data.

2. The apparatus of claim 1 wherein said IP packetization process controls said host computer to receive data from said one or more external network interface circuits which is not already in the form of an internet protocol packet and packetizing said data into an internet protocol formatted packet addressed to a device coupled to one or more of said local area networks.

3. The apparatus of claim 1 wherein said routing process controls said host computer to receive internet protocol formatted packets either from said IP packetization process or directly from an external network interface circuit and, with said network interface, look up the Ethernet address of the device coupled to said local area network that corresponds to the internet protocol packet's destination address, and do all the protocol conversions necessary to encapsulate each said internet protocol packet into one or more Ethernet local area network packets addressed to a device which requested data in said internet protocol packet and transmit same over the appropriate local area network to the device which requested said data, and further controls said host computer to receive Ethernet packets from devices coupled to said local area networks that include internet protocol packets via said local area network interface(s) and do all the protocol conversions necessary to strip off the Ethernet packet header and route the encapsulated internet protocol packet to the appropriate external network interface circuit for transmission on an external network to the server to which the internet protocol packet is addressed.

4. The apparatus of claim 1 wherein said management and control process is structured to control said host computer to receive Ethernet packets from devices coupled to said local area network(s) which contain requests to download specific web pages at URLs identified in said packet or to receive and distribute regularly scheduled video broadcasts over a CATV hybrid fiber coaxial cable system, a satellite downlink or a terrestial broadcast, or to request a video program to be delivered over said CATV hybrid fiber coaxial cable system or said satellite downlink or via a digital subscriber line local loop, and generating and sending appropriate control data to the appropriate one of said external network interface circuits to cause the requested data or video broadcast or video-on-demand program to be received.

5. The apparatus of claim 1 wherein said one or more external network interface circuits comprises a digital subscriber line modem.

6. The apparatus of claim 1 wherein said one or more external network interface circuits comprises a conventional POTS line fax and/or data modem.

7. The apparatus of claim 1 wherein said one or more external network interface circuits comprises an internet packet telephony circuit to interface said gateway to plain old telephone service and/or digital subscriber line phone lines from a public service telephone network central office.

8. The apparatus of claim 1 wherein said one or more external network interface circuits comprises a private branch exchange (PBX) telephony circuit for interfacing said gateway to one or more plain old telephone service (POTS) telephone lines which are internal or external to said customer premises and/or one or more digital subscriber line (DSL) phone lines from a public service telephone network central office, said PBX telephony circuit including a switch controlled by a plurality of processes controlling said host computer to implement PBX telephony functions for line devices such as telephones coupled to said one or more POTS or DSL lines or to said local area netork, said processes including a PBX application process, one or more processes implementing a TAPI dynamic linked library and a PBX card driver process.

9. The apparatus of claim 1 wherein said one or more external network interface circuits comprises a cable modem for interfacing said gateway to a CATV hybrid fiber coaxial cable system connection.

10. The apparatus of claim 9 wherein said cable modem is compatible with the DOCSIS 1.2 national standard for cable modems as that standard existed as of the filing date of this patent application.

11. The apparatus of claim 1 wherein said one or more external network interface circuits comprises a receiver for interfacing said gateway to a CATV hybrid fiber coaxial cable system connection, said receiver capable of receiving and demodulating and recovering digitized, compressed video-on-demand program data modulated onto a downstream carrier requested by a device coupled to said local area network and demultiplexing the audio and video components and transmitting the recovered data to said IP packetization process via said host bus.

12. The apparatus of claim 1 wherein said one or more external network interface circuits comprises a receiver for interfacing said gateway to a CATV hybrid fiber coaxial (HFC) cable system connection, said receiver capable of receiving analog video transmissions on said HFC requested by a device coupled to said local area network and digitizing and demodulate said analog video transmissions and then encoding the resulting data into a format in which it can be compressed, and then compressing the data and transmitting it via said host bus to said IP packetization process.

13. The apparatus of claim 1 wherein said one or more external network interface circuits comprises a receiver for interfacing said gateway to a satellite dish and receiving compressed digital data encoding a regularly scheduled television program modulated onto a downlink carrier requested by a device coupled to said local area network and demodulating and recovering said digital data and demultiplexing the audio and video data therefrom and transmitting said recovered digital data via said host bus to said IP packetization process.

14. The apparatus of claim 1 wherein said one or more external network interface circuits comprises a receiver for interfacing said gateway to a satellite dish and receiving compressed digital data encoding a video-on-demand television program modulated onto a downlink carrier requested by a device coupled to said local area network and demodulating and recovering said digital data and demultiplexing the audio and video data therefrom and transmitting said recovered digital data via said host bus to said IP packetization process.

15. The apparatus of claim 1 wherein said one or more external network interface circuits comprises a receiver for interfacing said gateway to a satellite dish and receiving analog regularly scheduled television programs modulated onto a downlink carrier requested by a device coupled to said local area network and demodulating and digitizing said television signals and encoding the digital data into a format that can be compressed and compressing said digital data and transmitting said compressed digital data via said host bus to said IP packetization process.

16. The apparatus of claim 1 wherein said one or more external network interface circuits comprises a receiver for interfacing said gateway to a satellite dish and receiving

digital data encoding a web page or other information from the internet and encapsulated into internet protocol packets requested by a device coupled to said local area network and that have been modulated onto a downlink carrier and demodulating and recovering said internet protocol packets and transmitting them via said host bus to said routing process.

17. The apparatus of claim 1 wherein said one or more external network interface circuits comprises a receiver for interfacing said gateway to a conventional terrestial broadcast television antenna and receiving a regularly scheduled television program signal requested by a device coupled to said local area network and modulated onto a terrestial broadcast carrier and demodulating said signals digitizing said signals and encoding the digital data into a format that can be compressed and compressing the digital data and transmitting said compressed digital data via said host bus to said IP packetization process.
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18. A gateway apparatus comprising:

a host computer having a host bus;

one or more local area network interface means for coupling said host computer to one or more local area networks than carry data between said gateway and one or more devices located within a customer premises;

one or more external network receiver means coupled to said host bus for interfacing said host computer to one or more networks external to said customer premises by receiving analog signals and digitizing and compressing them and supplying the compressed data to said host computer or receiving and recovering video and other data in digital form which has been modulated onto a dowstream carrier for transmission to said customer premises and supplying the recovered digital data to said host computer;

one or more external network transceiver means coupled to said host bus for interfacing said host computer to one or more networks external to said customer premises by receiving analog signals and digitizing and compressing them and supplying the compressed data to said host computer or receiving and recovering video and other data in digital form which has been modulated onto a dowstream carrier for transmission to said customer premises and supplying the recovered

digital data to said host computer and include an upstream transmitter for receiving digital data from said host computer and transmitting it outbound on an external network; and

wherein said host computer is programmed to implement an IP packetization process to receive data from said external network interface circuits and packetize it into internet protocol (IP) formatted packets, and programmed with a routing process to receive IP packets from said IP packetization process and encapsulate them into local area network packets and transmit them on the appropriate local area network via one or more of said local area network interfaces and for receiving local area network packets from devices coupled to said local area networks and stripping off the local area network packet headers and routing the encapsulated IP packets to the appropriate external network interface circuit for transmission over an external network, and an IP telephony and other processes to control said host computer to control line devices coupled to standard or DSL telephone lines or local area networks coupled to said gateway or line devices and other external network interface circuits coupled to said host computer via said host bus to implement IP telephony functions, and a management and control process for receiving requests for data from said devices coupled to said local area networks and sending digital control data to said external network interface circuits and/or line devices to control them to obtain said data.

19. The apparatus of claim ~~1~~ 18 wherein said one or more local area network interface means are Ethernet local area network interface cards and wherein said routing process controls said host computer to receive internet protocol formatted packets either from said IP packetization process or directly from an external network interface circuit and, with said network interface, look up the Ethernet address of the device coupled to said local area network that corresponds to the internet protocol packet's destination address, and do all the protocol conversions necessary to encapsulate each said internet protocol packet into one or more Ethernet local area network packets addressed to a device which requested data in said internet protocol packet and transmit same over the appropriate local area network to the device which requested said data, and further controls said host computer to receive Ethernet packets from devices coupled to said local area networks that

include internet protocol packets via said local area network interface(s) and do all the protocol conversions necessary to strip off the Ethernet packet header and route the encapsulated internet protocol packet to the appropriate external network transceiver means for transmission on an external network to the server to which the internet protocol packet is addressed.

20. The apparatus of claim 18 wherein said one or more external network transceiver means comprises a private branch exchange (PBX) telephony means for interfacing said gateway to one or more plain old telephone service (POTS) telephone lines which are internal or external to said customer premises and/or one or more digital subscriber line (DSL) phone lines from a public service telephone network central office, said PBX telephony means including a switch controlled by a plurality of processes controlling said host computer to implement PBX telephony functions for line devices such as telephones coupled to said one or more POTS or DSL lines or to said local area netork, said processes controlling said host computer including a PBX application process, one or more processes implementing a TAPI dynamic linked library and a PBX card driver process.

21. The apparatus of claim 18 wherein said management and control process is structured to control said host computer to receive Ethernet packets from devices coupled to said local area network(s) which contain requests to download specific web pages at URLs identified in said packet or to receive and distribute regularly scheduled video broadcasts over a CATV hybrid fiber coaxial cable system, a satellite downlink or a terrestial broadcast, or to request a video program to be delivered over said CATV hybrid fiber coaxial cable system or said satellite downlink or via a digital subscriber line local loop, and generating and sending appropriate control data to the appropriate one of said external network transceiver means to cause the requested data or video broadcast or video-on-demand program to be received.

22. The apparatus of claim 18 wherein said one or more external network transceiver means comprises a digital subscriber line modem means for interfacing said gateway to a digital subscriber line local loop.

23. The apparatus of claim 18 wherein said one or more external network transceiver means comprises a conventional POTS line fax and/or data modem means for interfacing said gateway to said conventional POTS telephone line to the central office of the public service telephone network.

24. The apparatus of claim 18 wherein said one or more external network transceiver means comprises an internet packet telephony means for interfacing said gateway to plain old telephone service and/or digital subscriber line phone lines from a public service telephone network central office.

25. The apparatus of claim 18 wherein said one or more external network transceiver means comprises a cable modem means for interfacing said gateway to a CATV hybrid fiber coaxial cable system connection.

26. The apparatus of claim 25 wherein said cable modem is compatible with the DOCSIS 1.2 national standard for cable modems as that standard existed as of the filing date of this patent application.

27. The apparatus of claim 18 wherein said one or more external network transceiver mean comprises means for interfacing said gateway to a CATV hybrid fiber coaxial cable system connection to request a specified video-on-demand program via an upstream message and for receiving and demodulating and recovering digitized, compressed video-on-demand program data modulated onto a downstream carrier requested by a device coupled to said local area network and demultiplexing the audio and video components and transmitting the recovered data to said IP packetization process via said host bus.

28. The apparatus of claim 18 wherein said one or more external network receiver means comprises means for interfacing said gateway to a CATV hybrid fiber coaxial (HFC) cable system connection to make said gateway capable of receiving analog video transmissions on said HFC requested by a device coupled to said local area network and digitizing and demodulating said analog video transmissions and then encoding the resulting

data into a format in which it can be compressed, and then compressing the data and transmitting it via said host bus to said IP packetization process.

29. The apparatus of claim 18 wherein said one or more external network receiver means comprises a means for interfacing said gateway to a satellite dish and receiving compressed digital data encoding a regularly scheduled television program modulated onto a downlink carrier requested by a device coupled to said local area network and demodulating and recovering said digital data and demultiplexing the audio and video data therefrom and transmitting said recovered digital data via said host bus to said IP packetization process.

30. The apparatus of claim 18 wherein said one or more external network transceiver means comprises a conventional modem means for making a dialup connection to a satellite uplink facility or video server and sending a message requesting delivery of a specified video-on-demand selection, and receiver means for interfacing said gateway to a satellite dish and receiving compressed digital data encoding a video-on-demand television program modulated onto a downlink carrier requested by a device coupled to said local area network and demodulating and recovering said digital data and demultiplexing the audio and video data therefrom and transmitting said recovered digital data via said host bus to said IP packetization process.

31. The apparatus of claim 18 wherein said one or more external network receiver means comprises means for interfacing said gateway to a satellite dish and receiving analog regularly scheduled television programs modulated onto a downlink carrier requested by a device coupled to said local area network and demodulating and digitizing said television signals and encoding the digital data into a format that can be compressed and compressing said digital data and transmitting said compressed digital data via said host bus to said IP packetization process.

32. The apparatus of claim 18 wherein said one or more external network receiver means comprises means for interfacing said gateway to a satellite dish and receiving digital data encoding a web page or other information from the internet and encapsulated into internet protocol packets requested by a device coupled to said local area network and that

have been modulated onto a downlink carrier and demodulating and recovering said internet protocol packets and transmitting them via said host bus to said routing process.

33. The apparatus of claim 18 wherein said one or more external network receiver means comprises means for interfacing said gateway to a conventional terrestial broadcast television antenna and receiving a regularly scheduled television program signal requested by a device coupled to said local area network and modulated onto a terrestial broadcast carrier and demodulating said signals digitizing said signals and encoding the digital data into a format that can be compressed and compressing the digital data and transmitting said compressed digital data via said host bus to said IP packetization process.

34. A gateway apparatus comprising:

a host bus;

a plurality of expansion card connectors electrically coupled to said host bus;

one or more expansion module printed circuit boards coupled to said host bus through one or more of said expansion card connectors, each expansion module including the appropriate circuitry to receive signals from an external network media comprised of either a hybrid fiber coaxial cable of a CATV system, a digital subscriber line local loop, an analog plain old telephone service line or a satellite dish, and to either recover digital data transmitted via said external network media or to receive analog signals transmitted via said external network media and generate digital data therefrom, and, depending upon the type of external network media to which each expansion module is coupled, to also transmit digital data modulated on a carrier signal out on said external network media;

one or more network interface adapters for coupling said gateway to one or more local area networks which convey digital data throughout a customer premises; ~~an~~

a host computer having a central processing unit or microprocessor coupled to said host bus and programmed to perform at least a management and control process to receive requests ~~tranmitted~~ TRANSMITTED from users to said gateway via one or more of said local area networks for data or video or audio programs

transmitted on a regularly scheduled or on-demand basis on one of said external network media and to react thereto by appropriately controlling said one or more expansion modules via data transmitted over said host bus to retrieve the requested data or video or audio program, and programmed to perform an IP packetization process to receive digital data from one or more of said expansion modules and said management and control process and encapsulate said data into an internet protocol packet addressed to the device on a local area network coupled to said gateway which requested said data, and programmed to perform a routing process to receive network packets containing internet protocol packets and to strip off the network packet header and to route said internet protocol packet to the appropriate expansion module for upstream transmission on a external network media and to receive internet protocol packets from one or more of said expansion modules or said IP packetization process and to look up the IP destination address and map it to a local area network address corresponding thereto and encapsulate the internet protocol packet in a local area network packet addressed to the device owning said IP destination address and route it to said device via the appropriate network adapter, and programmed with one or more IP telephony and/or PBX and/or other telephony enabled application programs to implement IP telephony and/or PBX functions through a TAPI dynamic linked library of programs which control said host computer to carry out standard and advanced telephony functions which can be invoked through a standard TAPI application programmatic interface and one or more telephony service provider programs and/or PBX expansion module programs which convert messages from one or more TAPI library programs to digital data sent over said host bus to one or more of said expansion modules to carry out one or more telephony functions.

35. A network adapter for coupling a conventional television to a local area network, comprising:

a network interface circuit having an input coupled to a local area network and having an output at which digital data encoding a compressed video appears and functioning to receive local area network packets encapsulating internet protocol format packets but only outputting internet protocol format packets encapsulated in local area network packets addressed to this particular network interface circuit;

means for receiving infrared or radio frequency commands and data from a wireless remote control or a wireless keyboard and for packetizing the data and commands into packets suitable for transmission over said local area network;

an internet protocol video circuit coupled to said network interface circuit for receiving internet protocol format packets from said network interface circuit and determining if the packet contains video or graphics data and stripping off the internet protocol format header and outputting graphics data at a graphics data output and outputting video data at a video data output;

a decompression circuit coupled to said video data output for decompressing the video data and outputting uncompressed video data in a YUV format at a first output and uncompressed audio data at second output;

an audio processor means coupled to receive said uncompressed audio data and process it to convert it to an analog audio signal;

a graphics circuit coupled to said graphics output for receiving graphics data and generating graphics data signals at a graphics output;

means coupled to receive said uncompressed video data and said graphics data signals and process both said graphics data signals and said uncompressed video data into NTSC, PAL or SECAM or composite format analog video signal which can be displayed on a television if coupled to a video input of said television; and

optionally, a video modulator for receiving said analog video signal and said analog audio signal and modulating them onto an radio frequency carrier at the frequency of a locally unused channel.